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1	1	Cog. Eng. T. Chiao	<i>T. Chiao</i>	4/26/96	40-35				
1	1	Cog. Mgr. J. Greenberg	<i>J. Greenberg</i>	4/24/96	40-35				
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1		Safety N. L. Sant	<i>N. L. Sant</i>	6/14/96	21				
1		CSR E. Dodd III	<i>E. Dodd III</i>	4/24/96	40-35				
1	1	Tech Review A. L. Hess	<i>A. L. Hess</i>	4/24/96	40-35				

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Stabilization of Residue Plutonium in L-9 Hood in Product Removal Room of PUREX With Polymeric Barrier System

T. Chiao

Westinghouse Hanford Company, Richland, WA 99352
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Key Words: L-9 Hood, Plutonium, Polymeric Barrier System, Criticality
Safety, Subcritical

Abstract: This report examines the application of Polymeric Barrier
System to stabilize the remaining plutonium inside L-9 Hood in PR Room,
Purex for criticality safety.

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CRITICALITY SAFETY EVALUATION REPORT 96-009

Title: Stabilization of Residue Plutonium in L-9 Hood in Product Removal Room
of PUREX with Polymeric Barrier System

Prepared by: Tang Chiao Date: 4/24/96
Tang Chiao, Criticality Evaluation Team of Nuclear Physics and Shielding

Reviewed by: A. L. Hess Date: 4/25/96
A. L. Hess, Criticality Evaluation Team of Nuclear Physics and
Shielding

Approved by: J. Greenborg Date: 4/25/96
J. Greenborg, Nuclear Physics and Shielding

**STABILIZATION OF RESIDUE PLUTONIUM IN L-9 HOOD
IN PRODUCT REMOVAL ROOM OF PUREX WITH
POLYMERIC BARRIER SYSTEM
Revision 0**

WHC-SD-SQA-CSA-508

June 1996

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LIST OF TERMS

ALARA	As low as reasonable achievable
CPS	Criticality prevention specification
CSER	Criticality safety evaluation report
NDA	nondestructive assay
PBS	Polymeric barrier system
PFP	Plutonium Finishing Plant
PNNL	Pacific Northwest National Laboratory
PR	Product removal
Pu	Plutonium
PUREX	Plutonium Uranium Extraction (Facility)

1.0 INTRODUCTION

This criticality evaluation discusses the deactivation activities and final conditions of the Plutonium Uranium Extraction (PUREX) facility L-9 hood. These conditions are evaluated for potential impacts of applying a polymeric barrier system (PBS) to fix the remaining contamination in the hoods. While a great deal of the evaluation is centered on the L-9 hood activities, the objectives of this analysis is to define conditions for similar hood activities in the future. This criticality safety evaluation report (CSER) was not used to support activities in the L-9 hood. However, this CSER documents the technical basis for activities in the L-9 hood (see Appendix A).

The applicability of this evaluation to other plutonium (Pu) bearing hood and the appropriate restrictions are discussed in Section 7.0. The primary considerations required for applicability of this evaluation are the blanking of process and water lines to the hood, and the removal of Pu such that the final material is dispersed in a more or less uniform manner through out the hood.

2.0 L-9 HOOD

The deactivation activities of the L-9 hood in the product removal (PR) room of PUREX included the blanking of all solution lines to the hood and the removal of the residual material for cleanup. The residual material included dry Pu nitrate. The methods of removal of the residual material, especially for the remaining fissile material, included flush and cleanup of the hood floors, walls, and equipment to the maximum extent possible without impacting operator safety and doses.

After the cleanup, the L-9 hood was assayed using nondestructive analysis techniques to determined the amount of Pu remaining in the hood. The nondestructive assay (NDA) was performed by Pacific Northwest National Laboratory (PNNL) (see Appendix B) and the results indicate that a total of approximately 1 kg of Pu remains on floors, walls, corners, and pockets of the L-9 hood.

The remaining Pu is a radiation source and a potential criticality safety concern, because the quantity of remaining Pu exceeds the minimum critical mass. However, additional flush and cleanup of Pu residuals is difficult and would cause significantly high exposures to the cleanup crews. In order to meet the as low as reasonable achievable (ALARA) principle for radiation exposure protection and to eliminate the criticality safety concerns, the PUREX team has stabilized the remaining Pu in the L-9 hood by applying a PBS to the inside walls and floor of the hood fixing the contamination.

The L-9 hood is located in the product removal (PR) room inside the PUREX facility. The floor dimensions of the hood are approximately 7.4 m x 0.53 m, but the inside of the glovebox is not partitioned. The side and the back walls of the glovebox are made of concrete for shielding purposes. The following drawings provides general information about the PR room and the L-9 hood:

- H-2-53309 — General arrangement of the PR room
- H-2-66145 — L-9 sample hood details.

The hood contains the L-9 tank consisting of three interconnected, 12.7 cm diameter steel columns as a Pu product sampler, and related pipings. A criticality drain was installed in the floor of this hood to prevent the buildup of liquid inside the hood.

3.0 QUANTITY OF PLUTONIUM IN L-9 HOOD

The NDA technique was used to identify the location and to evaluate the quantities of the remaining Pu in the L-9 hood. For assay purposes, the hood was divided into four segments along its length. PNNL performed the NDA. The details of the NDA results are presented in Appendix B. A summary of the NDA estimated quantity of Pu is listed in Table 2-1.

Table 2-1. Summary of Hood L-9 Plutonium Holdup Distribution.

Location	Estimated quantity of plutonium (planar) (g)	Estimated quantity of plutonium (linear) (g)	Estimated quantity of plutonium (point) (g)	Total estimated quantity of plutonium (g)
L-9: Section 1	100	240	80	420
L-9: Section 2	100	250	140	490
L-9: Section 3	40	50	80	170
L-9: Section 4	10	50	0	60
Total	250	590	300	1,140

The planar source is assumed to be a thin layer coating the face and back wall of the hood. The linear source is assumed to be concentrations on the floor, corners, and on tubing. The point source is assumed to be pockets or hot spots.

The following quoted information is taken from Appendix B:

"The total estimated quantity of plutonium is assumed to be spread throughout the hood, with larger quantities on or near the floor as may well be expected. The numbers in the table include the 126 g of plutonium removed on 4-17-4-18\96; therefore, the estimated plutonium remaining in the box currently is $\approx$ 1 kg. In addition, the gamma spectrometer results confirm the remaining plutonium is in the lower reaches of the glovebox, strongly support the column of point source values, and indicates no particular heavy buildup of material .."

4.0 POLYMERIC BARRIER SYSTEM AND THE APPLICATION OF PBS

According to the PUREX team, the Pu residue will be stabilized by applying a PBS to the inside hood surfaces. The PBS is a water soluble material, that is diluted with water when added to the inside surface of the hood, and will fix contamination. The concentrated PBS purchased from the vendor has a specific gravity between 1 and 1.2 and is 38 wt% water. This PBS is further diluted by the painters before application. The water will evaporate and leave the solid PBS (68 wt% of the purchased product prior to dilution) which has a hydrogen density of 8.7 wt% (water is 11 wt%).

The paint is to be applied to the hood using a low volume-high pressure spray pump and wand which has a very small diameter nozzle tip. The pump and PBS supply remain external to the hood at all times. No air or other motive fluid is used or needed. This method of application was selected because it minimizes resuspension of dry Pu powder, thus allowing the PBS to affix Pu powders to the surfaces. This technique cannot be used as a tool to transport Pu within a hood.

The PBS is to be applied as a single coating of about the same thickness as other paints. All surface areas and equipment within the hood will be stabilized. When finished, the painting nozzle is removed from the hood and metal covers are placed on all the ports (see Appendix C).

The amount of the mixture of PBS and water needed for the entire hood, walls, floor, equipment surfaces, etc., is estimated to be less than 19 L. Once the mixture is dried, the PBS is non-strippable.

5.0 CRITICALITY SAFETY EVALUATION

According to the NDA results given in Section 3.0, the description of PBS, and the procedures for applying PBS as stated in Section 4.0, the following data are established:

- There is no heavy buildup of Pu in any local spot (less than 140 g [0.31 lb])
- The surface Pu contamination most probably covers more than 1.0 m². Then, the maximum area Pu concentration will not exceed 2,160 g/m² (200 g/ft²)
- The contamination remaining in the hood will not be moved in the process of PBS applications. The distribution of the remaining Pu will not be disturbed
- The estimated thickness of the "paint" (the mixture of PBS and water) will be less than 0.5 cm if it is assumed (conservatively) that the entire "wet paint" is applied to the floor.

According to III.A7 (100)-3 of Criticality Handbook Volume II (Carter, 1968), the minimum areal criticality concentration for ²³⁹Pu is 2,160 g/m² (200 g/ft²). The critical solution depth for this Pu concentration must be more than 17.78 cm under full water reflection.

The "wet paint" material can be conservatively considered like water as a neutron moderator. The Pu concentration on the hood floor and on the wall is likely below the minimum area critical concentration and the maximum thickness of the "paint" is less than 0.5 cm even if assuming the entire "paint" is applied to the floor. In addition, the process of applying the "paint" is not going to move the current Pu distribution. Therefore, stabilizing the Pu residue inside the L-9 hood with the PBS is critical safe under normal conditions.

6.0 CONCLUSIONS AND RECOMMENDATIONS

A criticality accident may be possible if the following conditions exists.

- The criticality drain is plugged.
- External water (liquid) pours into the hood and the depth of inflow water (liquid) exceeds 17.78 cm.
- The residual Pu is re-distributed so that a local area Pu concentration exceeds 2,160 g/m² (200 g/ft²).

Hood L-9 will be sealed and all piping connected outside will be plugged. It is not credible to expect liquid ingress into this hood. Also, it is not credible to expect all residual Pu would be concentrated into a local region so that a high area Pu concentration ($2,160 \text{ g/m}^2$ [200 g/ft^2]) is attained. The accident scenario requires two independent failures (plugged criticality drain and liquid inflow) which meets the double contingency requirement for criticality prevention.

According to the manufacture of PBS, the "paint" should stay in place at least 20 years when it is dry. However, if the paint flakes off and falls on the floor, the hood will remain sub-critical because the thickness of the accumulated peered off "paint" is unlikely to exceed 17.78 cm.

However, in order to ensure that the L-9 hood remains sub-critical, the following requirements shall be implemented:

- The amount of the mixture of PBS and water applied on the entire hood; walls, floor, equipment surfaces, etc., shall not be more than 19 L
- No container larger than 1.0 L is allowed in the hood
- The criticality drain shall be maintained operational
- A "permanent" posting shall be installed on hood L-9 to list the quantity of residual Pu inside the hood and note the application of PBS for stabilization of the residue.

7.0 APPLICATION OF POLYMERIC BARRIER SYSTEM ON OTHER SIMILAR HOODS

Application of PBS or other non-strippable "paint" material on similar hoods to fix the residual Pu contamination in PUREX and Plutonium Finishing Plant (PFP) can be supported by this CSER if the following conditions and requirements are satisfied.

- The hood shall be cleaned with reasonable and customary methods so that no visible Pu contamination remains.
- All solution lines to the hood shall be blocked off.
- The "paint" shall be non-strippable when it is dried.
- There is no heavy buildup of Pu in any local spot (less than 140 g).
- The maximum areal Pu concentration shall not exceed 972 g/m^2 (108 g/ft^2).
- The contamination remaining in the hood shall not be moved in the process of PBS (or other "wet paint") applications. The distribution of the remaining Pu shall not be disturbed.

- The estimated thickness of the "paint" (the mixture of PBS and water) shall be less than 0.5 cm if the entire "wet paint" is applied to the floor.
- No container larger than 1.0 L is allowed in the hood.
- The criticality drain shall be maintained operational.
- A "permanent" posting shall be installed on the hood to list the quantity of residual Pu inside the hood and note the application of the PBS for stabilization of the residue.

8.0 REVIEWER'S COMMENTS

It was established in Addendum 1 to CSAR 86-011 (Frair, 1995) that shutdown hood cleanup rules for criticality safety developed for PFP hoods were also appropriate to the PUREX hoods. The analyses and arguments reported above provide an extension of the previous evaluations to more adequately address the stabilization of fissile residues using fixing paints. The criticality prevention specifications (CPSs) to be developed for cleanup/stabilization for the PUREX hoods should include only the appropriate items from the PFP CPS (#Z-165-80012), as supported by CSER 86-011, and the new rules on painting.

9.0 REFERENCE

- Carter, R. D., G. R. Kiel, and K. R. Ridgeway, 1968, *Criticality Handbook*, ARH-600, Vol. II, Atlantic Richfield Hanford Company, Richland, Washington.
- Frair, D. E., 1995, *Addendum 1 to CSAR 86-011: Glove Box Clean Up in PUREX*, Rockwell Hanford Operations, Richland, Washington.

APPENDIX A
INTERNAL MEMO FROM TANG CHAIO
AND A. L. HESS

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Post-it™ Fax Note	7671	Date	4/22	# of pages	1
To	Ed Dodd III	From	Denelle Friar		
Co./Dept.		Co.			
Phone #		Phone #	372-2891		
Fax #	783-5067	Fax #			

Date: April 22, 1996

To: File

From: Tang Chao and Al Hess

Subject: Applicability of Addendum 1 to CSER 86-011 to Painting the PR Room Glovebox in PUREX

The subject request was received from Ed Dodd III, PUREX CSR. The glovebox is believed to contain as much as 1200 grams Pu distributed throughout the glovebox. It is impractical to remove any more of the contamination.

Because the amount of Pu exceeded a minimum critical mass, the CSR wanted to verify that Addendum 1 to CSER 86-011 was applicable.

The proposed cleanup operation includes painting the interior of the glovebox with a non-strippable paint that would be thinned with water, as needed. The amount of paint and water was estimated to be about 5 gallons, a quantity that if spilled would only be a layer 1/4 inch deep on the glovebox floor.

Reasonable efforts will be taken to apply the paint to minimize the redistribution of the Pu, as by excessive flow or subsidence of the applied paint.

The discussions of glovebox flooding indicated that the fire sprinklers are still active in the room, that the glovebox fire sprinklers are a limited volume (about 12 gallons), manually-operated system, and that process water sources to the glovebox itself have been blanked off. The fire sprinkler system will be shut off as well, along with the electrical power when the clean up is complete. Meanwhile, the existing glovebox criticality drain will be left open as an aid in maintaining glovebox ventilation. The room is still posted fire category C. We concluded that flooding the glovebox was an unlikely event, and that flooding with a plugged glovebox criticality drain meets the double contingency requirements referenced in the Addendum. PUREX conduct of operations provides assurance that operators will remove paint cans, rags, and other debris (resulting from the painting efforts) from the glovebox when the painting is finished. The intent is to remove materials that might block the criticality drain.

We concluded that, despite the larger than usual inventory in this glovebox, the subject addendum encompasses the work scope described.

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APPENDIX B

**PACIFIC NORTHWEST NATIONAL LABORATORY NONDESTRUCTIVE
ASSAY RESULTS FOR L-9 HOOD**

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April 18, 1996

Andrew G. Westra
Westinghouse Hanford Company
P. O. Box 1970
Mail Stop S6-21
Richland, WA 99352

Dear Mr. Westra:

PNNL NON-DESTRUCTIVE ASSAY RESULTS

This report summarizes data collected March 30, 1996, April 3, 1996, and April 11-17, 1996, using the PNNL NDA Systems on the L9 Glovebox in the Product Removal (PR) Room of the PUREX Building, 200 East Area. The PNNL NDA Systems employ high-resolution (HPGe) gamma-ray spectrometers and/or total-neutron slab detectors to characterize radioactive emissions using non-destructive assay (NDA) techniques.

The counts were performed to assess the upper-limit quantity of plutonium expected within the L9 Glovebox and to assess its relative distribution. We were informed that the glovebox had never processed fluorides. Our gamma-ray data confirmed this information. We were also told to assume that the majority of the plutonium would be on or near the floor of the glovebox. Again, data collected using a collimated gamma-ray detector confirmed this assumption.

Alpha-Particle Activity Measured via Passive Neutron Counting

The passive thermal-neutron counter is a slab-type detector that employs 10 $^{10}\text{BF}_3$ tubes surrounded by 2.54-cm-thick high-density polyethylene. The 5-cm-diameter $^{10}\text{BF}_3$ tubes have an active length of roughly 180 cm and a fill pressure of 12 kPa. The boron is enriched to 95% ^{10}B .

Alpha-particle activity in the glovebox results in neutron emissions via (α, n) reactions, predominantly with oxygen and other light elements of the matrix. Neutron emissions are also generated by spontaneous fission, typically of even-numbered transuranic isotopes, such as ^{240}Pu . We were told to assume weapons-grade (6% ^{240}Pu) plutonium nitrate in the PR Room L9 Glovebox.

The neutron counts were taken at the face of the glovebox and again at a distance of approximately 27 cm at 4 separate positions along the 20-foot length of the glovebox; background counts were taken on a platform just inside the door to the

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PR Room. Figure 1 shows the layout of the PR Room with the counting positions marked as "Section 1", "Section 2", "Section 3", and "Section 4." Sections 1 and 2 were visibly more contaminated than Sections 3 and 4, with Section 4 visibly being the least affected by previous campaigns.

The narrow false-floor adjacent to the face of the L9 Glovebox made positioning of the detectors difficult and limited the distance that the detectors could be moved back from the glovebox face. The narrow construction and the concrete walls resulted in a "neutron cave" in which emitted neutrons bounce between walls until thermalized and absorbed: a given neutron typically has several chances to be counted by a detector, which increases the apparent efficiency of the neutron detector; a point source does not appear to strictly follow the $1/R^2$ -law but some smaller fraction of 2; a line source does not appear to strictly follow the $1/R$ -law but some smaller fraction of 1. These anomalies complicate the interpretation of observed data.

Table 1 summarizes count rates obtained along the L9 Glovebox on 3 separate occasions. The count on 03/28/96 established a baseline for the L9 Glovebox neutron count. A total of 425 g of plutonium were removed prior to the count on 04/03/96. A total of 228 g of plutonium were removed prior to the count on 04/11/96.

Table 1. Summary of Counts Taken Along the L9 Glovebox in the PR Room of PUREX.

Location	Distance to Face (cm)	Count Rate [03/28/96] (c/60s)	Count Rate [04/03/96] (c/60s)	Count Rate [04/11/96] (c/60s)
Outer Area	--	3749 $\pm$ 87	--	--
L9: Section 1	0	253910 $\pm$ 151	168130 $\pm$ 346	110616 $\pm$ 462
L9: Section 1	27	220903 $\pm$ 222	150402 $\pm$ 571	100955 $\pm$ 170
L9: Section 2	0	146020 $\pm$ 504	126598 $\pm$ 333	113487 $\pm$ 66
L9: Section 2	27	137034 $\pm$ 100	117744 $\pm$ 121	105251 $\pm$ 345
L9: Section 3	0	59333 $\pm$ 261	51214 $\pm$ 127	58203 $\pm$ 21
L9: Section 3	27	58064 $\pm$ 54	53126 $\pm$ 205	57738 $\pm$ 94
L9: Section 4	0	27225 $\pm$ 229	22670 $\pm$ 285	23635 $\pm$ 109
L9: Section 4	27	28449 $\pm$ 95	24018 $\pm$ 499	24349 $\pm$ 174

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Activity Measured via Gamma-Ray Spectrometry

Several sets of data were acquired using a high-purity germanium (HPGe) gamma-ray spectrometer. A collimator was designed to fit an ORTEC hand-held system. The collimator system consisted of a 1-cm-thick sleeve of lead that fit over the snout of the detector and shielded the germanium crystal from low-energy gamma rays entering from oblique angles. Lead inserts with square holes were used to provide various aspect ratios. The spectrometer with this collimator system was calibrated with a 100-gram weapons grade PuO_2 standard that simulated a point source.

Gamma-ray results were used to identify radiological activity within the L9 Glovebox, to locate hot spots, and to establish concentration levels. The gamma-ray system confirmed that fluorine was not present in the L9 Glovebox at a level that would detrimentally inflate the neutron count rate via the $^{19}\text{F}(\alpha, n)^{22}\text{Na}$ reaction; the presence of fluorine is manifest in the gamma-ray spectrum as 511-keV and 1275-keV gamma rays that are not as well resolved as adjacent peaks due to prompt capture/decay effects. The gamma-ray spectrometer also indicated the presence of ^{137}Cs in the L9 Glovebox with a higher ratio at Section 4 (relative to the plutonium) than in the other sections. The presence of ^{228}Th was also observed, presumably arising from ^{235}U (since no activity from ^{228}Ac was observed that would indicate ^{228}Th as the parent of the ^{228}Th).

Results and Conclusions

The neutron data were heavily used to estimate the quantity of plutonium present in the L9 Glovebox. The known response of the neutron counter to neutron sources at different positions allows corrections to be made for the cross-talk expected when counting adjacent sections. The gamma-ray data were used to aid the model used to correlate expected readings with actual measurements. Some allowance was made for the "neutron cave" effect and the apparent increased efficiency of the neutron counter.

The source term was apportioned in each section to a planar, a linear, and a point source. The planar source is allowed to be on both walls and does not vary with distance from the detector. The planar and linear sources are assumed to be close to the far wall of the glovebox.

The results of using this model and a similar, independent model are provided in Table 2. The Planar source is assumed to be a thin layer coating the face and back wall of the glovebox. The Linear source is assumed to be concentrations on the floor, along corners, and along any tubing. The Point source is assumed to be any pockets or hot spots.

The change in count rate for each section after known quantities of plutonium were removed proved invaluable in estimating the quantity remaining. The

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approximate location of the removed quantities also contributed to estimating total amounts.

The total estimated quantity of plutonium is assumed to be spread throughout the glovebox, with larger quantities on or near the floor as may well be expected. The numbers in the table include the 126 g of plutonium removed on 4/17-18/96; therefore, the estimated plutonium remaining in the box currently is ≈ 1 kg. Additional data taken with the neutron counter after the 126 g quantity had been bagged up, but before it was removed from the hood, completely support the table data. Additionally, data taken with the gamma-ray spectrometer, especially looking at the floor through a hole in the side of the lead sleeve, further confirms these estimated quantities, further confirms that the preponderance of the remaining plutonium is in the lower reaches of the glove box, strongly supports the column of point source values, and indicates no particular heavy buildup of material that might constitute a criticality concern.

Table 2. Estimated Quantity of Plutonium: L9 Glovebox of the PR Room in PUREX.

Location	Estimated Quantity of Plutonium [Planar] (g)	Estimated Quantity of Plutonium [Linear] (g)	Estimated Quantity of Plutonium [Point] (g)	Total Estimated Quantity of Plutonium (g)
L9: Section 1	100	240	80	420
L9: Section 2	100	250	140	490
L9: Section 3	40	50	80	170
L9: Section 4	10	50	0	60
Total	250	590	300	1140

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April 18, 1996

Any questions may be directed to me at Mail Stop P8-08, by cc:Mail, by FAX at 376-2329, or by phone at 376-0405.

Sincerely,

Dr. Richard J. Arthur
Sr. Research Scientist

TRU Results Review and Concurrence:

Dr. Ronald L. Brodzinski
Staff Scientist

Enclosures
Attachments

cc w/attachments:
DE Robertson, P8-01
MD Winterrose, P8-01
File /LB

APPENDIX C
COMMUNICATION WITH MARK EHGUSEN VIA CCMail

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COMMUNICATION WITH MARK EHGHEUSEN VIA CCMail

Per our discussion I will try to fill you in on the stabilization procedure used for the PR Room and N Cell gloveboxes. All the gloveboxes are first NDA'd to determine Pu content. (As yet only the L9 glovebox contained greater than 150 grams of Pu.)

The glovebox is stabilized by removal of all gloves and application of a Polymeric Barrier System (PBS) to the inside surfaces. The PBS is a water soluble material which is diluted with water which when added to the inside surface of the glovebox, will fix contamination. The concentrated PBS purchased from the vendor has a specific gravity between 1 and 1.2 and is 38 % weight per cent water. This PBS is further diluted by the painters prior to application. The water will evaporate to leave the solid PBS (68 weight per cent of the purchased product prior to dilution) which has a hydrogen density of 8.7 weight percent (water is 11 %).

The paint is applied to the glovebox using a LOW VOLUME-HIGH PRESSURE SPRAY PUMP AND WAND WHICH HAS A VERY SMALL DIAMETER NOZZLE TIP. The pump and PBS supply remain external to the glovebox at all times. No air or other motive fluid is used or needed. This method of application was selected because it MINIMIZES RESUSPENSION OF DRY PU POWDER THUS ALLOWING THE PBS TO AFFIX PU POWDERS TO THE SURFACES. (This application technique cannot be used as a tool to transport the Pu within a glovebox.)

The PBS is applied in as a single layer about the same thickness as other paints. All surface areas and equipment within the glovebox will be stabilized. The painting nozzle is removed from the glovebox and metal covers are placed on all the ports.

The criticality drain will remain open to the canyon to provide contamination control thru differential pressures.

I hope this assists in evaluating the glovebox stabilization process. If you have further questions, call me at 3-3837 or Ed Dodd at 3-1293.

Mark

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